DECLARATION

I, Masaharu Kobayashi, a patent attorney, of c/o Kobayashi Patent Office, Sansho 133 Building, 2nd Floor, 33-2, Takadanobaba 1-chome, Shinjuku-ku, Tokyo 169-0075, Japan, hereby declare that I have translated Japanese Laid-Open Patent Publication No. 63-276540 published November 14, 1988 and attach a copy of my translation hereto and certify that it is a true translation to the best of my knowledge and belief.

All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements and the like so made are punished by fines or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

The 27th day of January, 2003

M Kobayashi

Masaharu KOBAYASHI

Partial translation of 63-276540

(11) Publication number: 63-276540
(54) Title of the Invention: Reflection preventing laminate
(21) Application number: 62-112091
(22) Date of filing: May 8, 1987
(71) Applicant: Daicel Chem Ind Ltd
(72) Inventor: Tei MURAKAMI

(lines 2 to 11 in the left section of page 1)

1. Title of the Invention Reflection preventing laminate

2. Scope of patent claims

(1) A reflection preventing laminate which is characterized in that a binder resin layer containing an inorganic fine powder having an average particle diameter of 0.1 to 4 μm is provided to one surface or both surfaces of a transparent substrate layer.

(2) A reflection preventing laminate according to claim 1, wherein the surface unevenness thereof is 0.05 μm to 10 μm in ten-point average roughness Rz according to JIS B-0601 and the number of the uneven parts is 200 to 1,000 per area of 0.01 mm^2.

(From line 18 in the upper left section of page 2 to line 14 in the lower right section of page 2)

Further, problems are not only the reflection preventing properties of a reflection preventing laminate itself. For example, when a flat reflection preventing laminate is laminated on a curved-surface display device such as a television cathode-ray tube, a central portion where the distance between both is small and a circumferential portion where the distance is large are different from each other in

the degree of display obscurity. Accordingly, the larger the reflection preventing properties of the reflection preventing laminate itself are, the larger the difference is. The present invention has developed a reflection preventing laminate which does not have such a defect and which has a low haze value in spite of good reflection preventing properties and, when laminated on a curved-surface display device such as a television cathode-ray tube, is small in obscurity in circumferential portions.

(Means to solve the problems)

The present invention has the following constitution for accomplishing the above object.

That is, as shown in (a) and (b) of Fig.1, the present invention is directed to a reflection preventing laminate in which a binder resin layer 3 and/or a binder resin layer 3' containing an inorganic fine powder 2 having an average particle diameter of 0.1 to 4 μm is/are provided to one surface or both surfaces of a transparent substrate layer 1.

Concerning the binder resin layer containing an inorganic fine powder 2 having an average particle diameter of 0.1 to 4 μm, the above average particle diameter means an average particle diameter of the inorganic fine powder measured in the state where the binder resin layer is formed on the transparent substrate. Generally, the above binder resin layer is formed by applying a binder resin liquid containing inorganic fine powder to the transparent substrate layer and then drying the applied liquid. However, the above average particle diameter does not mean an average particle diameter of the inorganic fine powder in the liquid.

In terms of performances, the reflection preventing laminate of the present invention is a reflection preventing laminate in which its surface has a ten-point average roughness

Rz of 0.05 μm to 10 μm according to JIS B-0601 and the number of the uneven parts in an area of 0.01 mm^2 is 200 to 1,000.

Although the transparent substrate is not specially limited, it includes glass, acrylic, PET, polycarbonate, epoxy, polyethersulfone, polyalylate and the like. In an uncolored case, it is preferred to use a transparent substrate having a visible light transmittance of approximately 80 % or higher. When it is used as a base material for a colored laminate, a stained transparent substrate may be used. Further, the thickness of the transparent substrate can be selected at will depending upon a usage of the laminate. The binder resin is selected from transparent ones having adhesive strength to the substrate layer. When the substrate layer is made of polyethylene terephthalate, for example, preferred are binder resins containing alkyl-etherified melamine, a butylal resin and alkyl acid phosphate and optionally containing a ketone resin as required, disclosed in JP-A-60-92850.

As the fine powder, it is preferred to use silica. As the silica fine powder, there is used one having an average primary particle diameter of generally about 5 to 100 mμ, preferably 20 to 50 mμ. When the average primary particle diameter is 5 mμ or less, undesirably, a mat coating composition can not be obtained and the surface glare preventing properties are insufficient. When it exceeds 100 μm, undesirably, it is difficult to form a uniform coating film and the transparency decreases. The amount thereof is approximately 2 to 30 parts by weight, preferably 3 to 10 parts by weight, per 100 parts by weight of the binder resin. When it is lower than 2 parts by weight, undesirably, the surface glare preventing properties are insufficient. When it is more than 30 parts by weight, undesirably, the transparency decreases and a haze increases so that resolution becomes insufficient.

(lines 10 to 13 in the upper left section of page 3)

The reflection preventing laminate of the present invention is obtained by homogeneously dispersing the silica fine powder in a coating composition in high dispersibility to obtain a mat clear coating composition, applying the clear coating composition to the transparent substrate and curing the applied composition by drying.

IN THE UNITED STATES PATENT OFFICE

In re application of Takuma HATTORI et al.
Serial No. 09/273,261
Filed : March 22, 1999
For : Attachment film for electronic display device

I, Takuma HATTORI, declare that :

1. I have conducted experiments which are described in the attached report;

2. I am the coinventor of the present invention, and a staff member of the Technical Research Laboratory of Tomoegawa Paper Co., Ltd. and I have studied the outstanding Official Action dated September 10, 2002.

3. I graduated from Utsunomiya University, the industrial chemistry course of Department of Industry in March 1992. I joined Tomoegawa Paper Co., Ltd. in April 1992, and was attached to the Electronic Materials Division in April 1995, where I have been and am engaged in the study and development of adhesive for electronic display device and the like since April 1995.

4. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements and the like so made are punished by fines or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

The 10th day of January 2003

Takuma Hattori

Takuma HATTORI

Experimental Report

1. Purpose of Experiment

To clarify the dispersibility of carbon blacks which have different pH from each other in an adhesive.

2. Experimental method

2-1. Preparations of an adhesive and a colored adhesive film

(1) An adhesive in which a carbon black having a pH of 4 or less is dispersed and a colored adhesive film thereof

A flask having a thermometer, a stirrer, a reflux cooling tube and a nitrogen-introducing tube was charged with 94 parts by weight of n-butyl acrylate, 6 parts by weight of acrylic acid, 0.3 part by weight of benzoyl peroxide, 40 parts by weight of ethyl acetate and 60 parts by weight of toluene, and then nitrogen was introduced through the nitrogen-introducing tube to provide a nitrogen atmosphere in the flask. Then, the contents were heated up to 65°C, and polymerization was carried out for 10 hours, to give an acryl polymer solution having a weight average molecular weight of approximately 1,200,000 (number average molecular weight of approximately 300,000) and a Tg of about -49°C. Ethyl acetate was added to the acryl polymer solution such that the resultant solution had a solid content of 20 % by weight, whereby an acryl polymer solution a for a master batch was obtained. 0.1 part by weight of N,N,N',N'-tetraglycidyl-m-xylenediamine was added to 100 parts by weight (as a solid content) of the solution a, to give an adhesive coating liquid a'.

1 part by weight of carbon black Special Black 6 (trade name, supplied by Degussa, primary average particle diameter 17 nm, pH 2.5) was added to 100 parts by weight (as a solid

content) of the acryl polymer solution a for a master batch, and the mixture was stirred to obtain a master batch solution A in which the carbon black was fully dispersed.

0.2 part by weight of the master batch solution A was added to 100 parts by weight of the adhesive coating liquid a'(adhesive concentration 20 % by weight), and the mixture was stirred so as to form a homogeneous solution. Then, the solution was applied to a 100 μm-thick transparent PET film such that a dry adhesive layer had a thickness of 25 μm, and the resultant layer was dried, to obtain a colored adhesive film A.

(2) An adhesive in which a carbon black having a pH of more than 4 is dispersed and a colored adhesive film thereof

1 part by weight of carbon black #2300(trade name, supplied by Mitsubishi Chemical Co., Ltd., primary average particle diameter 15 nm, pH 8) was added to 100 parts by weight (as a solid content) of the same acryl polymer solution a for a master batch as that obtained above, and the mixture was stirred to obtain a master batch solution B in which the carbon black was fully dispersed.

0.2 part by weight of the master batch solution B was added to 100 parts by weight of the same adhesive coating liquid a' as that obtained above, and the mixture was stirred so as to form a homogeneous solution. Then, the solution was applied to a 100 μm-thick transparent PET film such that a dry adhesive layer had a thickness of 25 μm, and the resultant layer was dried, to obtain a colored adhesive film B.

2-2. Evaluations of colored adhesive films

The above colored adhesive films A and B were each attached to a transparent glass plate. Then, the colored

adhesive films A and B were measured for transmissivity, haze, a-value and b-value with a haze meter (Haze Meter NDH2000, supplied by Nippon Denshokusha).

3. Results of Experiments

The transmissivity, haze, a-value and b-value of each of the colored adhesive films A and B are shown in the following table. Further, the values in the following table are averages obtained by measurements of arbitrarily-selected five points of each of the colored adhesive films A and B.

Table

Colored adhesive film	Transmissivity (%)	Haze (%)	a-value	b-value
A	72.86	0.82	-0.016	+2.93
B	67.67	13.51	+0.686	-0.41

The colored adhesive film A had a higher transmissivity and a lower haze than the colored adhesive film B. That is, the colored adhesive film B is low in the transparency of the adhesive and high in the scattering of light. Therefore, when the above film B is used for a display, an obtained display has a low contrast and poor visibility. Further, as a result of visual observation of the adhesive layers of the colored adhesive film A and the colored adhesive film B through an optical microscope, the colored adhesive film B had a lot of carbon black aggregates having a size of several-tens μm and so that it was confirmed that the dispersibility of the carbon black was poor. Further, the colored adhesive film A had no carbon black aggregate which was able to be found through an optical microscope.

4. Conclusion

The carbon black having a pH of 4 or less is excellent in the dipersibility in the adhesive. As a result thereof, the adhesive layer thereof has a high transparency and a low light scattering. It is obvious that, when the carbon black is used for an attachment film for an electronic display, the carbon black shows excellent aptitude.